

Table of Contents

Foreword xix
Acknowledgments xxi
Introduction xxiii

Part I **The Essentials of Mobile Application Development**

1 .NET Compact Framework—a Platform on the Move 3

- Getting Started with Mobile Application Development in Visual Studio 3
 - Choosing the Version of Visual Studio 4
 - Other Development Software You Need 5
 - Choosing Your Platform: Pocket PC, Smartphone, or Windows CE? 7
 - The Difference Between Windows CE and Windows Mobile 9
 - Choosing the .NET Compact Framework Version 14
- Understanding the Differences Between the .NET Framework 2.0 and .NET Compact Framework 2.0 20
 - Application Configuration Files 23
 - ClickOnce 24
 - Ngen.exe 25
 - Remoting 25
 - Serialization 25
 - Printing 25
 - Web Forms 25
- Understanding the Differences Between .NET Compact Framework Version 1.0 and Version 2.0 26
 - Windows Forms 27
 - Display and Layout Management 28
 - Data 29
 - Communications 30

COM Interop	30
Graphics Programming	30
Security	31
Threading	31
Performance Monitoring	31
Introducing .NET Compact Framework Version 3.5	31
Using Community Resources	33
Microsoft patterns & practices Mobile Application Blocks	34
OpenNETCF Smart Device Framework	34
Summary	35
2 Building a Microsoft Windows Forms GUI	37
Understanding Windows Forms Version 2.0 Enhancements	38
Using the Same Workflow as for Developing Desktop Applications	39
Mapping Device Screens to Device Forms	42
Screen Layout	42
Closing a Form	43
Form Navigation	47
Exploring Important Windows Forms Controls	50
<i>Panel</i>	51
<i>TabControl</i>	52
Menu (Soft Keys), <i>ToolBar</i>	53
<i>Microsoft.WindowsCE.Forms</i>	54
Creating Your Own Controls	56
Handling Input	57
Taps	57
SIP and Hardware QWERTY Keyboard	59
Hardware Keys	60
Considering the Physical Screen	61
Orientation (and Size)	61
Resolution	63
Microsoft patterns & practices Orientation-Aware Control	66
Alternative Design	67
Developing for Smartphones	69
Control Behaviors	69
Navigation Paradigm	70

	<i>InputModeEditor</i>	71
	IntelliSense for Smartphone Projects	71
	Developing for Windows CE–Powered Devices	71
	Summary.....	72
3	Using SQL Server 2005 Compact Edition and Other Data Stores	73
	Using SQL Server 2005 Compact Edition Databases.....	74
	Creating a Database Using Visual Studio 2005.....	74
	Creating a Database Using SQL Server 2005 Management Studio.....	76
	Connecting to an Existing Database.....	77
	Creating Tables, Indexes, and Foreign Keys.....	78
	Deciphering <i>SqlCeExceptions</i>	83
	Creating Connections to Data in Your Project	85
	Creating a Project Data Source	86
	Designing and Programming Strongly Typed <i>DataSets</i> and <i>SqlCeResultSets</i>	87
	Building a Data-Bound GUI.....	111
	Building a Quick UI Using the Visual Tools	111
	Programming the <i>BindingSource</i> Control	113
	Data Binding Details Forms	118
	Data Binding with the <i>SqlCeResultSet</i>	123
	Advanced Data Binding	127
	Formatting Data in <i>DataGrid</i> Controls.....	132
	Persisting Data Without a Database.....	134
	Serializing <i>DataSet</i> Objects	134
	Serializing Objects.....	136
	Summary.....	141
4	Catching Errors, Testing, and Debugging	143
	Connecting to a Target.....	143
	Device	144
	Emulator	146
	Best Choice	149
	Compile-Time Errors.....	150
	Exception Handling: Same as the Full .NET Framework	153

Runtime Exceptions	156
Diagnosing the Cause of the Exception	157
It Is Your Fault	160
Avoiding Exceptions Getting Thrown	161
Handle the Exception and Recover Appropriately	162
Protecting the Boundaries (or Global Exception Handling, the Hard Way)	164
Global Exception Handling	167
GEH on the Full .NET Framework	168
GEH in NET Compact Framework 1.0	168
GEH in .NET Compact Framework 2.0	168
GEH Choice: Single-Method vs. Multiple-Method Approach	169
Some Exceptions Worthy of Further Mention	171
<i>WebException</i>	171
<i>SocketException</i>	172
<i>SqlCeException</i>	172
<i>InvalidOperationException</i>	173
<i>MissingMethodException</i>	174
<i>MissingManifestResourceException</i>	175
<i>TypeLoadException</i>	175
The Log Files	176
Loader Log	177
Interop Log	178
Network Log	178
Error Log	179
Finalizer Log (Version 3.5)	179
Remote Performance Monitor	179
Instrumentation	180
Breakpoints	180
Tracepoints	182
<i>Debug.WriteLine</i>	184
Tracing to File	184
Unit Testing	186
Community Project	186
Deploy to My Computer	186
Patterns and Practices	187
Visual Studio Code Name "Orcas"	187
Summary	187

5	Understanding and Optimizing .NET Compact Framework Performance	189
	What Every Developer Should Know	189
	Understanding the Compact CLR Engine	191
	JIT Compiler	191
	Garbage Collector	194
	Version 1.0 to Version 2.0 Improvements	197
	.NET Compact Framework Performance Statistics	198
	Activating Performance Counters	198
	Viewing the Data	198
	Performance Counter Descriptions	199
	Remote Performance Monitor	206
	Measuring Performance Programmatically	210
	Performance Guidance	213
	Tips and Tricks	213
	Parting Thoughts	218
	Summary	218
6	Completing the Application: Packaging and Deployment	219
	Implementing Help	219
	Creating HTML-Based Help	220
	Starting Help Topics from Code	223
	Master Table of Contents	224
	Help on Smartphone Devices	225
	Locking Down Your Application	225
	Kiosk Mode	225
	Hardware Buttons	226
	Locking Down the User Interface	227
	Third-Party Solutions	227
	Deploying the Runtime	228
	Building a Device Installer	229
	Visual Studio Installer Tools	229
	Device Installer Project Type	230
	Adding Files and Setting Targets	230
	Adding Shortcuts	230
	Writing Registry Settings	230
	Compression	231

Security Policies and Code Signing	231
Signing Your Code	233
Design Guidelines and Mobile2Market	233
The Global Assembly Cache	234
Strong Naming Your Assemblies	234
When and How to Use the Global Assembly Cache	234
Native CSetup.dll	235
Testing Your .cab File	238
Building a Desktop Installer	238
Adding Your .cab Project	238
Adding Other Application Files	239
Automating the Device-Side Installation	239
Adding a Custom Installer Action	239
Running the Installer	240
Summary	240

Part II **Solutions for Challenges in Mobile Applications**

7 Exchanging Data with Backend Servers	243
Architecting a Data Synchronization Application	243
Designing for the Mostly Disconnected Client	244
Designing for Stale Data	245
Choosing the Synchronization Technique	245
Using Web Services for Data Synchronization	246
Authenticating Web Services Clients	247
Using Web Services on Occasionally Connected Clients	252
Compressing Web Service Payload	261
Accessing SQL Server Directly by Using <i>SqlClient</i>	267
Understanding Differences from the Desktop .NET Framework	268
Programming <i>System.Data.SqlClient</i>	269
Using Transactions in the .NET Compact Framework	274
Synchronizing Data Using SQL Server 2005 Compact Edition	
Remote Data Access	275

Replicating Data Using SQL Server Merge Replication	293
SQL Server CE Merge Replication Architecture	293
Setting Up Merge Replication	295
Programming Merge Replication	303
Summary	306
8 Networking	309
Understanding Complications of Networking and Mobile Devices	309
Using Web Services	310
Understanding <i>System.Net</i>	311
<i>WebRequest</i>	311
Sockets	312
Using IrDA and Bluetooth	319
Using Serial Ports	320
Virtual Serial Ports	322
Understanding <i>System.Messaging</i>	323
Installing MSMQ	323
Summary	329
9 Getting Connected	331
Understanding Connections on Windows Mobile	331
Using Desktop Passthrough	335
Making Voice and Data Calls	337
Voice Calls	337
Establishing Data Calls	339
Microsoft patterns & practices Network Monitor Application Block	344
Enabling and Disabling Adapters	346
Cellular Phones	346
WiFi	350
Bluetooth	351
SMS Interception	353
Summary	354

10	Security Programming for Mobile Applications	355
	Implementing Good Security	356
	Performing Security Reviews	356
	Why You Should Not Hard-Code Secrets	357
	Understanding Good—and Bad—Techniques for Hiding Secrets	358
	Good Security Requires User Input	359
	Storing Credentials and Other Secrets Securely	360
	Protecting Data in SQL Server CE Databases	361
	Programming a Secure Solution by Using the Microsoft patterns & practices Application Blocks	362
	Encrypting Data	374
	Encrypting Using the AES Symmetric Algorithm	375
	Encrypting Using the RSA Asymmetric Algorithm	379
	Securing Network Connections	386
	Root Certificates Installed on a Windows Mobile–Powered Device	387
	Using a Self-Signed Certificate	389
	Validating User Input	392
	Perimeter Security: Securing Access to the Device	394
	Remote Management Using Exchange Server 2003 SP2 and the MSFP	395
	Signing Applications	397
	Understanding Windows Mobile Security Policy	398
	Provisioning Windows Mobile–Powered Devices	401
	Summary	403
11	Threading	405
	Why Use Threads?	406
	Understanding Underlying Fundamentals	407
	Windows CE	407
	<i>System.Threading</i>	408
	Maintaining a Responsive User Interface	412
	Message Pump	412
	Long-Running Tasks	412
	Demonstration Example	413
	Nonideal Solutions	414
	Using a Thread to Solve the Problem	415
	<i>BackgroundWorker</i>	421

Synchronizing Thread Activities and Access to Data	422
Race Conditions	422
Monitor	425
Thread Safe	427
Deadlocks Revisited	427
<i>ManualResetEvent</i>	429
<i>ThreadPool</i>	430
Understanding Threading and Application Shutdown	431
Background Threads	431
Thread Termination	433
Using .NET Timers	434
Summary	435
12 Graphics Programming	437
Drawing Images, Text, and Shapes	437
Understanding Painting Basics	439
Drawing Images	440
Scaling Images	441
Painting the Background	443
Painting Shapes and Text	443
Drawing Lines	446
Handling Different Resolutions	447
Rotating Text	449
Reducing Flicker by Using Double Buffering	452
Overriding <i>OnPaintBackground</i>	455
Using Advanced Formatting Techniques	456
Drawing Using Gradient Fill	456
Drawing Images with a Transparent Background	456
Drawing Using Alpha Blending	459
Summary	463
13 Direct3D Mobile	465
Getting Started with Direct3D	465
Using Direct3D in Your Programs	465
The Direct3D Device	466
The Draw Process	467
Getting a Direct3D Program Running	469

Working in Three Dimensions	469
Rendering a Triangle.....	470
Understanding Coordinates and Viewing	472
Moving an Object in Three Dimensions	473
From Programmer to Film Director	474
Matrices	475
Perspective and Transformations	476
Transformations and Animations	477
Adding More Complicated Transformations	479
Adding Textures	480
Creating More Complex Objects	483
Drawing Multiple Items	483
Lighting	485
Meshes	488
Lighting and Materials with Meshes	489
Direct3D on Mobile Devices.....	491
Direct3D and Events.....	491
Managing Orientation Change.....	492
Direct3D Drawing Performance	492
Handling Platform Diversity	493
Battery Life.....	493
Summary	494
14 Interoperating with the Platform.....	495
Understanding Platform Invocation Services.....	495
Marshaling	498
<i>NativeMethods</i>	502
Media Example	502
Callbacks into Managed Code	505
Understanding COM Interop	516
Importing COM Libraries.....	517
Manually Defining Interfaces	517
ActiveX Controls	523
Summary	523

15	Building Custom Controls	525
	Extending Existing Controls	525
	Overriding Events	525
	Creating Custom Controls	527
	<i>UserControl</i>	527
	<i>Control</i>	529
	Programming the Design-Time Experience	532
	Attributes	533
	Adding to Visual Studio 2005 Toolbox	544
	Summary	547
16	Internationalization	549
	Understanding the Challenges of Globalization	549
	Culture	552
	<i>CultureInfo</i>	553
	Revisiting the Challenges	555
	Using Language Translation (or Localization)	557
	Creating Resource Files	558
	Reading from Resources	559
	Locale-Specific Resources and Satellite Assemblies	562
	Actually Translating the Text	563
	Summary	564
17	Developing with Windows Mobile	565
	Pocket Outlook	565
	Personal Information Management	566
	Messaging	574
	State and Notifications	577
	Pictures	580
	Camera	581
	GPS	582
	Configuration	585
	Configuring the Device Programmatically	585
	Deploying Configuration Settings	585
	Telephony	586
	Earlier Versions of Windows Mobile	586
	Summary	586

Part III **New Developments**

18	Introducing .NET Compact Framework Version 3.5 and Visual Studio Code Name "Orcas"	589
	Introducing .NET Compact Framework 3.5	590
	Introducing Visual Studio Code Name "Orcas"	593
	Developing Applications with .NET Compact Framework 3.5	595
	Programming Compact WCF	595
	Programming Language Integrated Query	609
	Programming <i>System.IO.Compression</i>	616
	Unit Testing in Visual Studio Code Name "Orcas" Team System.	619
	Writing Unit Tests in Visual Studio Code Name "Orcas"	619
	Running Unit Tests	622
	Summary	624
	Index	625